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Fertility and Sterility in Domestic Animals.*

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The Process of Reproduction.

It may be as well in beginning briefly to remind you of the details of the process of reproduction as it occurs in farm animals. The essential male organs, the testicles, produce a fluid in which swim the minute tad-pole like spermatozoa. This fluid is stored up in a body (the epididymis) lying alongside the testicle in the scrotum, and during mating part of this store, diluted with other fluids, is ejaculated into the female passages. One emission of normal semen contains many millions of spermatozoa, but it is necessary for one only of these to unite with the egg of the female (fertilise it) in order to start the development of the young animal. The semen is usually deposited in the upper part of the vagina, the passage leading from the external opening, or it may be sucked by the contractions of the female organs through the narrow passage at the top (the cervix); it then passes into the womb (or uterus), and the spermatozoa in it, by lashing their tails, swim to the upper end of the uterus and up the tubes in which the two sides of the womb end. At the top of these tubes (Fallopian tubes) one of the spermatozoa meets the egg which has been produced by one of the paired essential female organs (the ovaries). The egg, which is like the yolk of a hen's egg in miniature, is ripened in a little vesicle in the ovary (the follicle), which ruptures at or after the end of "heat" and ejects the egg into the end of the tube where, if the female has been served, the spermatozoa are awaiting for it.

Unless a spermatozoon fuses with the egg it quickly perishes, and no more are shed until the next heat period. If fusion (or fertilisation) occurs, however, the egg begins to develop as it passes down the tube, entering the womb about four days later; here it is first nourished by a fluid (uterine milk) and afterwards becomes attached by membranes (the placenta or afterbirth) and is nourished by them until the time for birth occurs.

In the vesicle from which the egg has come there is formed a yellow body (the *corpus luteum*), which develops in the cow to about the size of a large grape. If the egg is not fertilised this yellow body remains large for about three weeks, during which time it prevents other eggs ripening. At the end of this period in the cow it begins to shrivel up and so allows the next egg to ripen and the next "heat" period to occur. The development and life of the yellow body is thus the cause of the delay between one "heat" period and the next; in the fowl, where no yellow body is formed, the eggs are ripened almost every day when conditions are favourable. It is possible, by inserting the hand in the rectum of a cow, to squeeze out the yellow body from the ovary, and after this is done the cow will ripen another egg and come on heat again in about two days' time; thus, instead of going three weeks between "heats," she can be brought on again in ten days or any other period that is desired.

If the egg is fertilised after service the yellow body does not shrivel up at the end of three weeks but remains large during the time the female is "in young"; this prevents the dam coming on heat during this time, and is also necessary for the well-being of the young, for if the yellow body is removed abortion quickly follows.

With this introduction we can now turn to the more practical side and consider those things which control fertility and sterility in the various species of farm stock. For this purpose it will be advisable to consider each species separately, for the problems are somewhat different in each case in the females, although the males may be treated together. Since the male produces at each emission many millions of spermatozoa, but the female at each "heat" only a very limited number of eggs (in the cow or mare one or occasionally two) it is obvious that in questions of fertility, or number of young produced at birth, the female is the main problem. With the male it is generally questions of sterility which have to be considered—a case of hit or miss.

Males.

It should be recognised that a male may have strong masculine characters and be capable and keen at service and yet may be sterile because his semen lacks the essential spermatozoa. If he is suspected of sterility his semen can be tested by catching a few drops as he comes off the female and examining it under the microscope for motile spermatozoa. Where there are two or three males in use in a herd and cases of sterility occur the service records of these cases should be examined to see whether they can be traced mainly to one male before proceeding to cast the blame on the females.

Causes of lack of spermatozoa in the semen are:—(*a*) Inflammations or stoppages in the passages leading from the testicles, and these are rarely curable. (*b*) Over fatness, sometimes leading to stoppage of the ducts and deposition of fatty substances in the testicles; this is to be cured by low feeding and plenty of exercise followed by a generous diet of protein but little fat-forming substances. (*c*) A change of climatic conditions, especially when a young male which has been "well done" is put into bad surroundings where he goes back in condition; it is with a rising condition

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of nutrition that the highest degree of fertility is attained, not with a stationary or receding condition. (*d*) Inbreeding is also occasionally a cause; some strains are capable of being inbred without loss of fertility, but others contain "traits" which, if concentrated, as characters are by inbreeding, lead to sterility, unless such an animal is kept under the very optimum of breeding conditions—a hard vigorous state developed by good protein and vitamin feeding, with plenty of exercise to work off surplus fat.

If often happens that males, bulls especially, are given too little exercise, and so grow too fat, with the result that they have to be sold to the butcher before their true breeding value, as shown by the offspring they produce, is known. This in a milk bull takes at least three years, and such a proven good sire cannot be kept too long; the length of his breeding life, however, will depend on the management he has received when young. When such old and heavy males are mated with immature females various mechanical devices may be used for supporting their weight during service.

When it can be done, it is advisable to distribute services as far as possible throughout the year, overmuch or lack of service being equally undesirable. No hard and fast rule can be laid down as to the number of females that should be mated with a male, for it depends on age, breed and feeding, while he can serve more if they are well distributed throughout the year. It is advisable to limit the number of services made by a young male both in the interests of his own development and in those of the fertility of the females with which he is mated. As a rule, the males of the lighter breeds can serve more females successfully than those of the heavier ones.

Males with testicles in the abdomen (rigs or cryptorchids) have desire and power of service, but are rarely fertile. If one testis has descended, however, they are generally fertile, but it is inadvisable to breed from such an animal as it is said that the condition is inherited.

Impotence or slowness of service may be due to over fatness and lack of exercise, or may be caused by some anatomical defect or the method of control adopted, as well as by warts or sores causing pain on erection or by bad feet rendering mounting painful. Cantharides or yohimbine is sometimes used to increase desire, but the irritating effect of these drugs is only temporary, and is followed by a reaction which often increases the trouble rather than curing it.

In the ram there is at the end of the penis a thread-like "worm" which is believed to convey the semen to the cervix of the ewe; it is said by some that if this be cut off the ram is rendered sterile or at any rate almost so—others, however, believe that the "worm" is not necessary for fertility.

Under the less intensive and ranch (or hill) conditions the male is usually run with the females, but as more intensive methods are practised individual matings are usually made. The latter system, however, involves labour, which is almost prohibitive in the case of ewes where the heat period is so short and slightly marked; it is also often the cause of much delay in the service of cows, especially when the heat periods are short. As a compromise, resort is sometimes made to the use of "teasers"—males which are rendered incapable of service by various means, such as a band of sacking over the penis or, better still, by those rendered permanently sterile by cutting the ducts (vasa deferentia) at the neck of the scrotum, taking care not to injure the blood vessels. These males pick out the females on heat, which can then be mated to selected males, thereby conserving the energies of the latter and extending their use to more females than would be possible if they were allowed free intercourse.

Females.

A few remarks of a general nature may be made before considering each species separately. The number of young a female produces depends, first, on the number of eggs ripened by the ovaries at each heat period, which in the cow is usually one, and occasionally two, but in the sow is up to twenty or more. Secondly, it depends on the number of these eggs which get fertilised and develop properly to the time of birth, for it frequently happens in the sow and also, although less often, in other species that some die off in different stages of development before birth.

I believe myself that the number of eggs which ripen at each heat period depends on some substance or substances, present in small quantities only, circulating in the blood of the animal and that the amount of these substances can be increased by breeding, suitable feeding, and by keeping the animal in a state of high vigour—not fat but in hard, thriving condition. In support of this idea it may be mentioned that when one or one-and-a-half of the ovaries is removed, the same number of eggs is ripened from the remaining portion, as would be had two whole ovaries been present in the animal. In a young growing animal too, in which these special substances are required for body growth, the fertility is usually less, and a smaller number of eggs is ripened than when the animal becomes mature. In an animal also which is secreting large quantities of milk, such as a sow suckling a large litter, the special substances being used for milk production are not available for the ovaries, so the eggs do not ripen, and the animal does not come on heat again until some days after the young are weaned or the milk flow ceases.

As to the age at which a young female should be bred from, no hard and fast rule can be laid down for it depends on breed and feeding conditions. Too early breeding leads to a lack of body development in the dam; the effect is shown slightly during the latter half of pregnancy, but mainly in the subsequent lactating period. If females are bred from early they should be particularly well fed at these times. On the other hand, breeders of early maturing pedigree stock, in their efforts to get a well developed animal, are sometimes apt to delay the first mating time too long, for early maturity lowers the age at which the first heat period occurs, and if many of these go by without pregnancy the ovaries are encumbered by a

number of yellow bodies containing fatty substances which clog them and increase that liability to sterility which always occurs where animals are not bred from regularly.

The Cow.

Although one frequently comes across animals which are more or less permanently sterile, it is not these cases which cause the greatest loss to cow-keepers, for unless they be valuable pedigree animals they can best be disposed of to the butcher. The main trouble with the cow is the delay that frequently occurs in getting animals served again after calving so that they may calve about the same time in the following year. If this is not done, the supply of milk will not be regular throughout the year and other cows will have to be brought in to fill the gaps; besides, if the cow does not calve within the year, the loss in milk produced is, on the average, in the region of about two gallons per day. It has been found from the books of Milk Recording Societies that in cows calving in the autumn months (September and October) there is a delay in getting them in calf again amounting on the average to about five weeks beyond the time (85 days after calving), at which they should be served in order to calve on the same date in the following year; on the other hand, cows which calve in April and May are, on the average, served in three weeks short of this time. In a state of nature the calves are almost all born in the spring, and so there is in the cow a natural tendency to breed more easily during the summer than in the winter months, and the cow-keeper has to combat this tendency in order to get a regular milk supply throughout the year. Cows remain "on heat" longer in the summer (up to 30 hours) than in winter (sometimes as short as six hours), moreover, the symptoms of heat are not so marked in winter, especially when they are kept tied up, for when running loose they jump one another and are seen. This fact accounts for the delay in the service of cows calving in the late autumn, for short heat periods of 6 to 10 hours, if they occur in the night, as frequently they do, are missed. Some cows and many heifers bleed from the vulva about one to two days after heat is over, and this will give an indication of when they may next be due, at which time a closer watch may be kept on them. Cows may vary from 16 to 24 days between their heats, but the majority go 20 days.

Among causes of sterility in cows may be mentioned persistence of the yellow body in the ovary, which prevents the animal coming on heat although she is not in calf. This yellow body may be squeezed out of the ovary by the hand inserted in the rectum, and the cow will then generally breed again. Sometimes it also happens that the egg is not shed at the heat period, but the vesicle in which it lies enlarges and forms a cyst. Such cows (nymphomaniacs) are always "bulling," but as their eggs are not shed they are sterile; they are frequently identified by a high tail head and swollen vulva. A cure may often be effected by squeezing and breaking the cysts by the hand inserted in the rectum. These operations, however, are a matter for the veterinary surgeon rather than the farmer, as also are other causes of sterility such as tuberculous or inflamed tubes and womb, and that most dreaded disease, contagious abortion, which is often followed by sterility.

Heifers born twin to a bull (Freemartins) are sterile in about 95 per cent. of cases, and unless the animal is a pedigree one it is not worth while keeping on chance of it proving fertile. If it is kept, however, until it is large enough for the hand to be inserted in the rectum, a diagnosis can be made by feeling whether the organs are normal. This method of rectal exploration is also useful in making a diagnosis of pregnancy, and with experience the period of gestation can also be told. As to whether a cow is "in calf" or not can also be predicted from the nature of the mucus from the cervix, which is abundant and rubber-like during pregnancy but sparse or watery and slimy in the "empty" state. With heifers in calf for the first time there is the additional symptom that after about the twentieth week of pregnancy the secretion from the teats becomes thick and honey-like instead of thin and watery as it is before this time.

The Ewe.

The main problem in the ewe is to get a large proportion of twins rather than singles. The sheep is at a disadvantage with many other classes of farm stock in intensive agriculture in that it produces barely one-and-a-half young per year as a return for the cost of the keep of the breeding ewe, while a sow may be expected to rear about 18 per year for the cost of her keep; in sheep, there is, it is true, the wool, but this is of small value as compared with the milk from a cow. A small difference in the lambing percentage of ewes therefore makes a great difference to the returns yielded by a breeding flock. As high fertility is a breed character, more developed in some breeds than in others, it is not surprising that the more fertile breeds are growing in popular favour to-day at the expense of the less fertile ones, which may be better or equally as good as regards mutton qualities.

If we are to breed for twins we should select our breeding stock from twins. If the selection of this character is left to chance by picking out only the best animals from the flock at six months old, or whenever selection is made, the majority picked out will be singles for, owing to the disadvantage to which they are placed as regards milk supply, twins are, even at this age, not so well developed, on the average, as singles; this applies to rams as well as ewes. It, therefore, often follows that the more carefully a man selects his breeding stock for size and development the more liable he is to decrease the fertility unless he has taken the precaution of selecting from those born as twins. Certain Flock Book Societies make it compulsory when entering an animal to state whether it was a single or a twin.

Fertility in sheep is, however, not all a question of breeding for, whatever the breeding capacity of a ewe is, it is susceptible to change by feeding and management. The number of lambs born is mainly determined by the number of eggs which ripen at the

heat period when the ewe was served. It is, therefore, essential that at this time the ewe should be in the best condition for breeding—a hard vigorous condition developed by good feeding on a rather protein diet and with exercise so that surplus fat is not accumulated. To this end a practice (flushing) of giving the ewes extra feed of mixed concentrates or of running them on rape, mustard, or a good new ley for a week or two before the rams are put in, is often used with good results on the lambing percentage. Such ewes in a rising state of nutrition ripen more eggs, and a larger number of lambs is conceived than would have been had no extra feed been given. It is more trouble but a good practice to break up the flock into as small lots as possible, which are run separately on different new leys, etc., for a few weeks before putting the rams in; the ewes under such conditions thrive better, and therefore give a higher percentage of lambs than when folded close together. The higher lambing percentage obtained in small flocks than in large ones is probably due to this cause.

The next critical time for the ewe is in the second half of pregnancy for, as the time of lambing is approached, the demands made on the mother by the young, and by the developing udder are increased. Bad feeding (with too fattening or too watery foods) therefore, at this time will not only cause weak lambs at birth and increase the tendency to "slip" lamb, but it also leads to deficiency in the milk supply after lambing. It is no good having a high fertility in the flock if the ewes have not enough milk to rear the lambs properly. What is said here as to the right kind of treatment in the second half of pregnancy, applies with equal force to all classes of stock.

The Sow.

The size of the litter is the chief consideration in the sow for, owing to the rate at which pigs multiply, and consequently the large numbers from which selection of breeding stock can be made, the sterile sow is of little consequence, and may be sent to the butcher. It is important, however, to have strains which possess a high average fertility and good milk supply, for the sow yields nothing else in return for her keep. It is this question of fertility and milk supply which is probably the reason why our best breeds of pork pigs are not more widely distributed among the commercial pig keepers of this country. They frequently use a boar of these breeds, however, on sows of the common stock which are prolific and good milkers. The reason why our better pork breeds are generally of lower fertility has been mentioned above, namely, that the members of a small litter get a better start in life, and at the age at which selection is usually made are better developed than those from a large one. Fertility, therefore, requires to be specially selected for, just as the other qualities are, and Herd Book Societies would do well to state the size of the litter of all animals entered.

It is quite possible for a sow's litter to be too large, for she cannot suckle more than she has teats. The optimum size will, however, be determined by her milk supply, which can be assisted by judicious feeding; when pigs are properly fed and managed, there is more often a danger of too small rather than too large litters.

A young sow, especially if of one of the later maturing breeds and mated early, will give on the average a smaller litter than an old one, owing to the smaller number of eggs which are ripened at each heat period; the maximum size of litter is usually attained by the third year. The average size of the litter also tends to be smaller during the winter months than in the summer months.

With adult sows fertility is dependent not only on the number of eggs shed, but on the number of those which develop to reach birth. An adult sow will shed on the average about twenty eggs at each heat period, but many of these perish, and are absorbed before birth and occasionally, if this occurs in a late stage of development, they may be found in the "cleansings" of the sow as mummified remains. This absorption is often so great that only a litter of 5 or 6 may remain at the time of birth, although the sow started with twenty. Similar cases occur in almost all species of animals, although not with such frequency as in the pig. The cause of these deaths is not yet settled; some attribute them to defects caused by the concentration of "traits" in breeding (lethal factors), while experiments are in progress to test whether they can be caused by feeding conditions of the sow during pregnancy. It is fairly certain, however, that they are not caused by overcrowding in the womb, for they may occur when only a few embryos are present; they are more frequent in domestic than in wild animals.

A sow while suckling a litter rarely comes on heat until a few days after the young are weaned, but occasionally she may come on before, if the number of young being suckled is small, or if milk secretion is temporarily suspended; in the latter case, however, if she is served it will generally be found, if she continues suckling after service, that she is sterile, the young having all been absorbed in the womb; this also occurs in rabbits. In the latter species, however, a doe can both suckle a litter, and be pregnant at the same time, if she is very well fed.

With the pig there is also the possibility that small litters may be produced when for any reason the spermatozoa of the boar are low in vitality, and the time of service of the sow does not shortly precede the shedding of the eggs. By lowering the vitality of the spermatozoa in rabbits, by leaving them in the female passages for some time before the eggs are shed, small litters from animals normally producing large ones may be obtained. The eggs of the sow are generally believed to be shed on the average about 36 hours after she comes on heat.

The Mare.

The chief problem with the mare is sterility, for the returns of the Ministry's Live Stock Scheme show that between 40 and 50 per cent. of the mares put to the stallion each year fail to produce a foal. This is a much larger percentage of sterility than occurs in any other class of farm stock, and far more than can be

accounted for by cases of infections of the tubes or womb, nymphomania (cystic ovaries), or other similar troubles to which all species are subject. One possible reason why the mare is less fertile than other animals is that she is less regularly bred from, and the ovaries become overgrown by a succession of yellow bodies formed at each heat period, which would be avoided if she were bred from regularly. When farmers are breeding only a few foals each year, as is usually the case, it is often a good plan to breed from the fillies at two or three years old before they are taken for regular work, as there is more likelihood of getting them in foal successfully, and also it causes less inconvenience in the work on the farm.

Another and probably more important reason why the mare is so sterile is that she is such a long time on heat as compared with other classes of stock, and it is not by any means certain that conception is possible as a result of a mating made at all times during this period. It has been found in the rabbit (and would also probably apply to other species) that the spermatozoa, after their deposition in the female tract, are capable of living for just under two days only; should service in the mare, therefore, occur more than two days before the egg is shed the mating will probably not prove fertile. Possibly it is for this reason that a stallion which is at stud or, on the farm, an uncut colt usually proves a more certain " getter " than the travelling stallion, for the mare can then be served at any rate twice during the heat period at sufficient intervals of time (and preferably once towards the end of heat) to catch and fertilise the egg when it is shed.

Another occasional cause of sterility is that some mares after service extrude the semen; such cases may be frequently got in foal by artificial insemination, that is, by catching the semen in a dish, and with a syringe injecting it into the womb direct so that it cannot be cast out.

Future Possibilities.

In conclusion, may I hazard two suggestions as to the future possibilities that may come with the application of the physiology of reproduction to farm animals. First, there are possibilities in artificial insemination. The transference of serum by post would render the services of the best males available to the whole country, for in one emission of a male there are sufficient spermatozoa to fertilise successfully two hundred or more females. So far the spermatozoa have been kept in a fertile condition only a short time artificially outside the body, but, naturally, they live in the passages of the male for about three weeks. With improved methods we may in the future be able to keep them successfully outside the body for a sufficient length of time to send them by post. They have been kept alive, that is, motile, for 10 days outside the body, but it has not yet been determined how long they are fertile under these conditions.

A second possibility is that of speeding up breeding in the ewe; some varieties will breed all the year round, and there seems to be no reason why, with selection and improved methods of feeding, the ewe should not produce three lots in two years or even two lots of lambs in a year, just as the sow does (and as Dorset Horns sometimes do) for the sow in the wild state has only one litter a year. The sheep has not improved in this quality under domestication so much as the pig; possibly it is because the sheep is usually kept under conditions more nearly similar to the wild state than is the pig. With the increasing intensity of cultivation in this country the more fertile pig will supersede the sheep unless steps are taken to increase the productivity of the latter. The sow produces two litters a year, and so the young can be economically slaughtered at six months old, the supply of young from breeding stock replenishing those killed. With the early maturing breeds of arable land sheep the age of slaughter could easily be lowered to six months by intensive management, but for the slow breeding habits of the ewe, which limit the supply to replenish those killed at this age. The Smithfield Club have for this reason found difficulty in instituting classes (for younger animals) to substitute for those of the older wethers, and by this means to develop earlier maturity in this species.

I am afraid there are many aspects of sterility and fertility which have not been mentioned, but as time has not permitted more I have tried to deal more especially with the ways in which the farmer himself can control fertility and avoid sterility in his stock, rather than to treat of the cure of cases of sterility due to disease which come into the province of the veterinary surgeon. The study of the way the body works has been used by veterinarians to help in the cure of disease, but it may also be of assistance to those who are exploiting the animal for the production of young, meat, milk or wool.

Acute Cocaine Poisoning, its Prophylaxis and Treatment in Laboratory Animals.

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The frequent occurrence of acute poisoning following the clinical use of cocaine as a local anæsthetic is well known despite the relative paucity of published records. This has led to a number of investigations on the study of methods of treatment (1) as well as to the development of substitutes with the hope that some substitute may be found which would be less toxic and at the same time be efficiently anæsthetic. The ready absorbability of cocaine, hence its anæsthetic usefulness on local application to mucous membranes, does not seem to have been duplicated by any of the newer preparations and as a consequence cocaine is still in common use with its all too frequent disastrous effects in susceptible individuals. Such a situation has therefore impelled us to approach the problem of cocaine poisoning, its mode of action and, based upon this, possible methods of treatment.

Our first attack on the problem lay in the study of the convulsant and just fatal dosage with careful observations of symptoms as they developed. The minimal fatal subcutaneous dose of cocaine for the rabbit is approximately 100 mgm. per kilogram body weight, a value generally obtained by earlier investigators. There regularly occurs a period of clonic convulsions when the respiratory movements become irregular with periods of shallow and rapid breathing. These terminate altogether after a period of respiratory tremor or flutter. The heart continues to beat for a few seconds after cessation of the respiration.

Since in the rabbit respiratory failure precedes cardiac failure, we were logically led to attempt artificial respiration as a means of treatment. This was arranged by the preliminary insertion of a tracheal cannula during a very short period of ether anæsthesia, after which the animal was allowed an hour or more for recovery when cocaine was administered subcutaneously. At the approach of respiratory flutter, artificial respiration was given by the usual positive pressure method and continued until the issue was determined. We very soon found by the use of this procedure that the animals could recover from dosages of cocaine up to 350 mgm. per kilogram body weight, hence an increase from 100 mgm. per kilogram to three and one-half times this amount. Artificial respiration was continued until the respiratory efforts became adequate. There frequently occurred, especially with the larger dosages, a period of complete respiratory arrest ranging from fifteen minutes to one-half hour, after which respiratory efforts began, increasing gradually up to complete adequacy. Thus we were satisfied that in the rabbit artificial respiration alone constitutes a very efficient restorative procedure in acute cocaine poisoning. Furthermore, since artificial respiration is effective, any other medullary depression produced by the drug directly or indirectly is of relatively little consequence in this animal.

Encouraged by these striking results, we attempted a similar procedure in the treatment of cocaine poisoning in the dog and cat, notwithstanding the fact that other investigators have reported the inadequacy of this treatment. Our results confirmed previous reports, namely, that artificial respiration alone, in the dog and cat, cannot be used to raise the minimal lethal dosage of cocaine.

The average minimal lethal subcutaneous dosage of cocaine for the dog lies between 15 and 40 mgm. per kilogram. The average between the smallest dose that has killed and the largest dose recovered from is, then, 27·7 mgm. per kilogram, while the average fatal dosage in the whole series is 26·7. For the cat this value is near 35 mgm. per kilogram.

The heart was observed to continue to beat for hours, during artificial respiration, in one instance for nine hours, without return of spontaneous respiration. Hyperpyrexia of high grade occurred, particularly in the dog, during the first hour of convulsions, in one instance rising to 45·5° C. Hyperpyrexia cannot be the usual cause of death, since some of the animals died without such a high grade fever, and in all the respiration ceased early and before a seriously high fever temperature was reached.

In the cat the temperature never, in our experience, rose to a serious height.

One cat apparently recovered from an otherwise fatal dose, appeared conscious, walked about, but when the artificial respiration was cut off the animal developed convulsions, apparently of asphyxial origin. This animal made respiratory efforts but they were inefficient. At autopsy neither obstruction nor lung rupture could be found. Several of the dogs made a few terminal gasps just prior to cessation of the heart beat even after hours of complete absence of spontaneous respiratory movements.

In the dog particularly, and to a less extent in the cat and rabbit, there regularly occurred during the earlier part of the convulsive period, excessive salivation and aerophagia with great distension of the stomach. We regularly relieved this gastric distension by a stomach tube which was left *in situ* as long as air swallowing continued.

Since the rabbit is subject to resuscitation by positive pressure artificial respiration, while the dog and cat are not, we thought it possible that the positive intrathoracic pressure might interfere with venous blood flow and hence our failure might be due to contributory mechanical circulatory interference. To control this possibility we performed, at the time artificial respiration became necessary, a double pneumothorax operation, allowing air free flow into and out of the pleural cavities. The result of the experiment was precisely the same as in the control animals without the double pneumothorax, hence we are forced to conclude that this artificial circulatory hindrance is not of fundamental importance.

In 1887 Feinberg (2) reported the interesting and suggestive observation that decerebration very greatly raises the tolerance of laboratory animals to cocaine. This is consistent with the clonic type of convulsions produced. Morita (3) reported the absence of typical cocaine effects on respiration in decerebrate rabbits. Richet (4) states that sensitivity to cocaine increases in different species of animals in proportion to the increasing complexity or development of the brain. Finally, the nature of the respiratory failure, suggestive of a respiratory tetanus, perhaps due to excessive irritability of the centres through direct or indirect influences, led us to attempt the use of hypnotic depressants.

Chloral hydrate and morphine both have been tried but, whereas they may diminish the severity of the convulsions, they have not been found to alter materially the course of the cocaine poisoning. We have tried ether as a controlling agent, but in our experience the concentration of ether required to control the convulsions has too great a depressant effect on the medullary centres so that death occurred apparently sooner than had ether not been given. These results agree with the conclusions reached by Feinberg. It should be noted that the dosage of cocaine used in these experiments with ether was 50 mgm. per kilogram, an amount almost double

the average minimal fatal dose. It is possible that with considerably smaller cocaine dosages ether might be of real value, but our interests lay in the direction of treating more severe rather than less severe cocaine poisoning.

An additional suggestion which aided us in our choice of hypnotics lay in the fact that cocaine addicts not infrequently use "Veronal" to control the excitement stage of the intoxication (5) and finally, Hofvendahl (6) attained considerable success in the use of barbital-sodium in combating the effects of cocaine poisoning in laboratory animals.

In the rabbit an intravenous injection of barbital-sodium was found to be capable of raising the minimal lethal dosage of cocaine from 100 mgm. per kilogram up to something above 150 mgm. If the dosage of barbital was too small the respiratory tremors still occurred even though convulsions were fairly well controlled. The animals would then die in the usual manner. If, however, the dosage of barbital was larger, the respiratory tremors did not occur and the animals recovered. With a still larger dosage of barbital the animals would die through depression. These facts strongly indicate that the respiratory centre requires depression either through direct depression or indirectly through the intermediation of some other mechanism. This appears to be paradoxical in that one usually thinks of cocaine death as being due to respiratory depression, yet the administration of a correctly chosen depressant, and one which is known to depress the higher functions of the brain as well as of the respiratory centre, is effective in offsetting the fatal action of cocaine.

In applying a generally similar method of treatment to cocaine poisoning in the dog, we were relatively much more successful than in the hypnotic drug treatment in the rabbit. By the administration of the hypnotic to dogs before the convulsions from cocaine developed, we were able to raise the minimal fatal subcutaneous dosage from 26·7 mgm. per kilogram to something over 100 mgm. and still have complete recovery. The hypnotic was made up by the use of approximately 100 mgm. of barbital-sodium per kilogram dissolved in 5 cc. of a saturated solution of paraldehyde in saline solution per kilogram. This hypnotic preparation produced, in conjunction with the depressant action of cocaine, a pronounced prostration, with the loss of most peripheral reflexes. This depression lasted from one to two hours. Recovery was gradual; first there appeared a return of peripheral reflexes, running movements, then later more and more return of muscle control. As soon as the animals were able to raise their heads they manifested an excessive and apparently insatiable thirst. After four to six hours the animals ran about the room as in a delirium. By the following day they would be somewhat depressed but in very good general condition, and after two or three days they appeared to be perfectly normal.

Intravenous injections of the hypnotic preparation, in the proportions given above, cause immediate cessation of the clonic convulsions regardless of the dosage of cocaine given.

In those instances in which we permitted convulsions to occur before the hypnotics were given, we found that the dosage from which dogs could recover was, roughly, inversely proportional to the duration of convulsions. Thus, in those animals receiving moderate doses of cocaine, *e.g.*, from 50 to 75 mgm. per kilogram, convulsions may be allowed to continue from two to five minutes before the hypnotic is given. With larger doses of cocaine such a period of convulsions produces a condition from which the animals do not recover notwithstanding complete control of the convulsions by the hypnotic. It then seems evident that the uncontrolled convulsions contribute to the exhaustion or other type of injury to the respiratory centre produced by direct action of cocaine on this centre. By removing the convulsant factor or other factors concomitant with the convulsions we find the centre can then tolerate the direct action of cocaine.

Finally, since the susceptibility to cocaine poisoning increases with the increasing complexity of the brain in different species of animals and since the dog is more amenable to the hypnotic treatment than the rabbit we are naturally led to anticipate that man, being more sensitive to both barbital and cocaine than the dog, should consequently be more responsive to this or a similar form of treatment. The proof of this must of necessity await its clinical application.

Conclusions.

1. The average minimal fatal subcutaneous dose of cocaine is 100 mgm. per kilogram body weight in the rabbit and 26·7 mgm. per kilogram in the dog.

2. Artificial respiration alone is sufficient to raise the minimal fatal dose in the rabbit from 100 mgm. to approximately 350 mgm. per kilogram. In the dog and cat artificial respiration does not significantly change the minimal fatal dose.

3. The prophylactic administration of a mixture of barbital sodium and paraldehyde to the dog produces a condition in which the fatal dosage of cocaine lies above 100 mgm. per kilogram, hence a rise from 26·7 to 100, or approximately a fourfold increase in tolerance.

4. Convulsions are completely and practically instantaneously controlled by an intravenous injection of the barbital paraldehyde mixture.

5. Likelihood of recovery from acute intoxication by cocaine in the dog is roughly inversely proportional to the time convulsions are permitted to continue. This, together with the facts that the convulsions are distinctly clonic in type and that the respiration ceases after a period of fluttering movements prove, we believe, that death in cocaine poisoning is due to the effects of direct medullary injury together with the deleterious indirect effects of the cocaine poisoned brain on the medullary centres.

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XUM

Etiology of Milk Fever.

By L. C. Maguire, F.R.C.V.S.,
Stow-on-the-Wold, Gloucestershire.

During the past year articles dealing with the etiology of milk fever have appeared in the *Veterinary Record*, which were very interesting and instructive—inasmuch as each one brought to light certain pathological and physiological characteristics which are almost constantly associated with the general syndrome of parturient paresis. However, in my opinion—and this is based upon clinical findings—none of the authors has grasped the pathological changes to which the animal's system is subjected, preliminary to, and during the course of, the disease.

The first paper on this subject appeared by Pugh (1924), in which he advances the theory that milk fever is caused by the absorption of botulinus-like toxins, following the onset of ketosis, due to faulty fat metabolism. He gives no experimental evidence in support of this theory, with the exception, perhaps, of finding acetone bodies in the urine of cows suffering from milk fever, but he offers no proof whatever as to the cause of this ketosis and, as a ketosis is a very common accompaniment of glycosuria, his whole theory seems untenable.

The second paper is by Dryerre and Greig (1925), in which they describe the symptoms of milk fever as due to intoxication resulting from a relative parathyroid deficiency. I do not know what experimental evidence these authors have to support this theory, but I believe their statement of a relative parathyroid deficiency to be correct. However, this does not necessarily point to the fact that it is this parathyroid deficiency which is responsible for parturient paresis, as parathyroid deficiency is quite a common thing during pregnancy.

That there is parathyroid deficiency is supported by the findings of Little and Wright, whose paper (1925) and, especially that part of it dealing with the determination of the calcium content of the blood is of very great interest. These writers have shown that in milk fever there is a decrease in the calcium content of the blood and, as the parathyroid is mainly responsible for calcium metabolism, any deficiency of the parathyroid would naturally react on the calcium concentration of the blood.

Admitting these findings to be correct, there is no proof that either parathyroid deficiency or a calcium deficiency of the blood is the cause of milk fever for, as already mentioned, parathyroid deficiency is very commonly present during pregnancy—and as the normal calcium control in the blood is dependent upon the normal stability of the parathyroid, there must be also a decreased calcium content of the blood during pregnancy.

During pregnancy there is an enormous strain on the thyroids, suprarenals and pituitary, and especially the two latter. This fact has a direct bearing on what I believe to be the true pathological condition of milk fever. This condition I believe to be a hypoglycæmia. The results obtained when milk fever is clinically treated as a hypoglycæmia and on estimation of the blood-sugar content are direct evidence in support of the theory that the condition is purely a hypoglycæmia.

Now let us consider how this hypo-glycæmia is brought about.

Any substance which causes the protein particles of the blood plasma to increase in number is called a conductor, and if the same substance later causes these particles to go into solution it is called a dehydrator. Adrenalin is an example of such a substance. Any substance which causes the protein particles of the plasma to increase in size is called a hydrator. Insulin is an example of such a substance.

All substances acting first as conductors, then as dehydrators, are direct antidotes to hydrators, because they cause the dispersion of the hydrated particles, therefore adrenalin acts as a direct antidote to insulin. Insulin causes a lowering of blood pressure, adrenalin a rise in blood pressure. We know that during pregnancy there is a constant increased output of adrenalin from the adrenals, so much so, that at the conclusion of pregnancy the adrenals may have become exhausted. This increased output of adrenalin during pregnancy may account for the almost constant presence of a slight glycosuria.

An overdose of insulin will cause excessive hydration and a consequent precipitation of the protein particles in the cerebral capillaries, and the clinical picture then presented is exactly the same as that presented in parturient paresis, namely, the preliminary nervous disturbances, the lowered blood pressure and the resultant coma and death. In a condition of this kind adrenalin is not sufficiently powerful to be of much value, but in cases of milk fever we all know how it helps and its place is taken by either the intravenous injection of glucose solution (200 c.c. of a 10 per cent. solution will suffice) or the subcutaneous injection of oxygen or by the method of mammary inflation. The best way to get precipitated protein particles into circulation again is to break them up and this is best achieved by the above methods. Clinically I find that as good and much quicker results are obtained by treating cases of milk fever by the intravenous injections of glucose as by the orthodox method of pumping air or oxygen into the udder, as in all the cases where I have tried it, the patients were invariably on their feet again within an hour, although two of the cases were comatose when treatment began.

Now, in my opinion, what actually occurs in a case of milk fever is, that for some reason or other, possibly an anaphylactic reaction, or owing to the removal of the inhibiting action of adrenalin, brought about by complete exhaustion of the suprarenals, the portion of the pancreas which is responsible for insulin and is relatively inactive during pregnancy,suddenly becomes hyperactive and pours out an excessive amount of insulin, which causes a hypoglycæmia and a precipitation of the protein particles of the plasma in the cerebral capillaries.

The following tables show the amount of sugar in blood samples taken before and at various intervals after treatment with air and oxygen inflations and after injection of glucose, the normal amount of blood-sugar in a healthy cow being estimated at from ·08 to ·12 grammes per cent.

CASE NO. I. A JERSEY COW.

When preliminary sample of blood was taken she was partially comatose.

	Sugar content per cent.
Before air inflation	0·04
30 mins. after	0·06
60 mins. after	0·07
90 mins. after	0·09

CASE NO. II.

Animal comatose.

Before glucose injection ...	0·05
20 mins. after	0·12
40 mins. after	0·10
60 mins. after	0·09

This cow was on her feet one hour after injection. Other experiments of the same kind, one with a subcutaneous injection of oxygen, and one each with udder inflation and injection of glucose, gave similar results to the above

Another point of interest has arisen since the introduction of a new method of feeding dairy cows, with the result that an old theory seems to be exploded. I refer to the theory that a cow in good condition at the time of calving, was considered more prone to contract milk fever than one in an average or poor condition. The new method of feeding to which I refer is one in which all bulky and gross feeding material is curtailed, as much as possible, and concentrated, highly nutritive diet substituted. This method of feeding improves the milk yield of the cows considerably and, in order to be highly effective, it is applied to the cows six or eight weeks prior to the date of calving, and is known among farmers as "steaming." According to the above mentioned theory, the result of this method should be that at parturition the cow would be a perfect subject for an attack of milk fever. But, to our surprise, the cows fed in this manner rarely, if ever, go down with this disease. In certain herds of pedigree dairy shorthorns, where the average number of milk fever cases per annum was six to ten, under the old feeding methods, now, since the adoption of 'steaming,' the number of cases of the disease has dropped to *nil*. I have made enquiries in other herds outside my practice where this mode of feeding is adopted and have found the same results.

The explanation of this would seem to be that owing to the improved condition of the cow she is better able to withstand the factor which causes the instability of the insulin-secreting portion of the pancreas.

The one thing I am still doubtful about is :—What is this factor which brings about the sudden excessive output of insulin into the animal's system ?

Until this is brought to light we shall not be able to explain the true pathological syndrome of milk fever.

Uterine Disturbance in Swine.

A. T. Kinsley, in "Veterinary Medicine."

In recent years frequent reports have been received of the occurrence of inflammatory and other disturbances of the uterus in swine. Such conditions appear to have become much more prevalent during the last few years, probably because of the fact that intensive breeding has apparently increased infections of the genital organs of these animals. Metritis is much more common in sows than is ordinarily suspected. It is a condition of economic importance and should be given careful consideration by veterinarians.

According to the present information, it appears justifiable pathologically to classify porcine metritis as catarrhal, purulent and septic. The primary object of such a classification is for convenience in discussing this condition.

Metritis is usually a sequel of abortion or difficult parturition, although this condition has been observed in sows in which parturition was apparently normal. Some gilts, bred and unbred, have been observed that showed marked evidence of metritis. In one herd in which there had been extensive losses of pigs, this condition was demonstrated by autopsy in several gilts.

This condition in sows, like the related condition in cows and other animals, is probably caused by a variety of micro-organisms. It is possible that some cases of metritis may be caused by one specific kind of bactierium, but in most cases there is apparently a combination of microbian invaders. Pyogenic cocci, *B. abortus* and representatives of the colon typhoid group are the microbes most commonly associated with metritis in sows.

Catarrhal metritis is of common occurrence and may be acute or chronic. The condition is manifested by mucous or mucopurulent vaginal discharge. The affected animal will appear unthrifty and may not conceive. The external genitals may appear swollen in the early stage of the disease. This type of metritis has been observed in gilts and mature sows and when it assumes a chronic form it is troublesome to overcome.

Purulent metritis is manifested by a purulent vaginal discharge. It is more severe than the catarrhal type. The affected animal usually has a diminished appetite or inappetence and there is usually a rise of temperature. In some cases the infection apparently extends and involves the peritoneum, and in such cases the affected animal will show evidence of colicky pains. This type of metritis is characterised by an intense inflammatory disturbance of the uterine walls and there may be quantities of pus accumulated in the uterine cavity. The uterine walls are usually thickened and lose their tonicity because of infiltration of the inflammatory exudate. Purulent metritis usually runs a much more rapid course than the catarrhal type, is much more severe and more frequently fatal.

Septic metritis is characterised by a sudden onset. The affected animals will present a tucked-up appear-

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ance and refuse all feed and because of the high temperature they may drink extraordinary quantities of water. The temperature in these cases is usually high, respiration and pulse rate increase proportionately. Septic metritis is characterised by an intense inflammation of the uterine walls with an accompanying necrosis. The uterine cavity usually contains quantities of a putrid fluid and the uterine mucosa may slough or appear as a macerated débris. Thrombic formation in the uterine veins is not at all uncommon. The infection may extend and involve the fallopian tubes and ovaries.

The peritoneum usually becomes involved and, if the patient lives sufficiently long, metastasis and thrombic formation may occur in any organs of the body.

Catarrhal metritis is a relatively mild affection. It is usually chronic and rarely fatal, although it may terminate in sterility. Purulent metritis is a severe febrile disturbance and is fatal in a large percentage of cases.

Septic metritis is sudden in onset; is sthenic and destructive. This type of metritis is usually associated with dystocia and is prone to occur in those cases that have uterine infection prior to parturition.

The treatment of porcine metritis has not been entirely satisfactory. Local treatment is most applicable in such cases but the small size of the genital organs makes this form of treatment difficult. A small horse catheter may be used for this purpose as it can be passed into the uterine cavity. The use of a dilute solution of tincture of iodin or grain alcohol has given favourable results. Care should be exercised when iodin solutions or other antiseptics are used as douches that the fluids are all drained out before leaving the patient. Quinin bisulphate in 20-grain doses injected subcutaneously into the axillary space three times daily has been reported to be of value, especially in cases of septic metritis.

Licensing of Stallions under the Horse Breeding Act, 1918.*

The complete figures now available for the licensing year ended 31st October, 1925, show that the decline in the number of stallions licensed in England and Wales under the Horse Breeding Act, 1918, has continued. The total number of licences issued for the service season of 1925 was 1,849, as compared with 2,210 in 1924; 2,761 in 1923; 3,479 in 1922, and 3,816 in 1921. The following table shows that the decrease is again much more marked in the case of shire and other heavy stallions, than among other breeds:—

Service Season.	*1921*	*1922*	*1923*	*1924*	*1925*
Shires	2,463	2,174	1,634	1,195	953
Other heavy horses ...	636	591	486	424	350
Light horses (including ponies)	717	714	641	591	546
Totals	3,816	3,479	2,761	2,210	1,849

In connection with the decline in the number of heavy stallions travelling for service, reference may be made to the Ministry's Scheme for the improvement of heavy horses which was reinstated in 1924, and which it is hoped will do something to encourage the revival of breeding, especially among the small farmers who ceased breeding altogether in face of the conditions arising out of the war, and the temporary withdrawal of the Ministry's scheme in 1922. This scheme made slight progress during the service season of 1925 and it is hoped that in due course it will tend to assist in the recovery of the heavy horse breeding industry. Particulars of the scheme may be obtained from the Ministry.

Notwithstanding the somewhat serious position indicated above, it is satisfactory to note that the main object of the Horse Breeding Act—the elimination of the unsound travelling stallion—has been achieved in a very large measure. During last season, only two unlicensed stallions were reported on the road, and in both cases proceedings were instituted by the police and resulted in convictions. Six licensed stallions were reported as travelling unaccompanied by licenses, and in two of these cases the grooms in charge were prosecuted.

Stallion owners in possession of licences for the year ended 31st October, 1925, are reminded that these licences expired on that date and should have been returned to the Ministry. Applications for renewals, as well as for new licences, should be made as early as possible on forms

* Reprinted from the *Journal of the Ministry of Agriculture and Fisheries*, December, 1925.

TABLE I.

	Heavy Breeds.					Light Breeds.									Pony and Cob Breeds.									
Pedigree Stallions: *i.e.*, Stallions entered or accepted for entry in the recognised stud book of their breed.	Shire	Clydesdale	Suffolk	Percheron		Hackney	Thoroughbred	Arab	Cleveland Bay	Welsh Roadster	Hunter	Yorkshire Coach	American Trotter		Welsh	Fell	Dales	Polo and Riding	Shetland	Highland	Dartmoor	Welsh Cob		
Licensed	918	125	146	47	—	133	152	15	6	2	5	3	—	—	26	21	18	22	6	—	—	65	—	1,710
Refused	32	2	3	2	—	4	10	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	54
Applications	950	127	149	49	—	137	162	16	6	2	5	3	—	—	26	21	18	22	6	—	—	65	—	1,764
	Types.					Types.									Types.									
Non-Pedigree Stallions: *i.e.*, Stallions not entered or accepted for entry in a recognised stud book.	Shire	Clydesdale	Suffolk	Percheron	Others	Hackney	Thoroughbred	Arab	Cleveland Bay	Welsh Roadster	Hunter	Yorkshire Coach	American Trotter	Others	Welsh	Fell	Dales	Polo and Riding	Shetland	Highland	Dartmoor	Welsh Cob	Others	
Licensed	35	4	1	—	27	18	—	2	1	1	3	—	5	6	4	—	8	2	—	—	—	14	8	139
Refused	1	—	—	—	1	1	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	5
Applications	36	4	1	—	28	19	—	2	1	1	3	—	6	6	5	—	8	2	—	—	—	14	8	144
Total Licensed ...	953	129	147	47	27	151	152	17	7	3	8	3	5	6	30	21	26	24	6	—	—	79	8	1,849
Ttotal Refused ...	33	2	3	2	1	5	10	1	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	59
Total Applications	986	131	150	49	28	156	162	18	7	3	8	3	6	6	31	21	26	24	6	—	—	79	8	1,908

which may be obtained from the Secretary, Ministry of Agriculture and Fisheries, 10 Whitehall Place, London, S.W.1.

TABLE II.

BREED.	Number of Applications.	Number of Refusals.	Per cent. of Refusals.	REASON FOR REFUSAL. Roaring.	Whistling.	Sidebone.	Ringbone.	Cataract.	Bone Spavin.	Defective Genital Organs.	Shivering.	Stringhalt.	Defective Conformation.
Pedigree :—													
Shire ...	950	32	3·37	9	12	5	1	4	–	–	1	–	–
Clydesdale	127	2	1·57	–	2	–	–	–	–	–	–	–	–
Percheron	49	2	4·08	1	1	–	–	–	–	–	–	–	–
Suffolk ...	149	3	2·01	–	1	–	–	–	1	–	1	–	–
Hackney ...	137	4	2·93	–	1	–	–	–	1	–	1	1	–
Thoroughbred ...	162	10	6·17	–	3	–	–	1	–	1	–	4	–
Arab ...	16	1	6·25	–	–	–	–	–	1	–	–	–	–
Non-Pedigree :													
Heavy ...	69	2	2·90	–	–	1	–	–	1	–	–	–	–
Light ...	38	2	5·26	–	–	–	–	1	–	1	–	–	–
Pony & Cob	37	1	2·70	–	–	–	1	–	–	–	–	–	–
Total Refusals	–	59	–	11	20	6	2	6	4	2	3	5	–

"Veterinary Research and Human Medicine."

"The story of a South African farm could, it is said, have been told in three words—drought and locusts. But this is by no means the whole of the story; the stock-raiser of experience could add many more chapters on the vegetable and animal pests which used to render his calling such a precarious one. Indeed, most of the minor horrors of farming seem to be rife in South Africa; and yet on the whole the farmers prosper, and the amount of land under cultivation and of stock being raised increases every year. The explanation lies in the help in combating pests and diseases given to the farmer by the Department of Agriculture of the Union through its Division of Veterinary Education and Research. The main laboratories and experimental farms of the Division are at Onderstepoort, near Pretoria, and we give elsewhere in this issue some account of the manner in which a triple function of routine, research, and education is there fulfilled. Anyone who notes the scope of the activities of the Division must be impressed with the important part played by veterinary science in the life of the subcontinent; but however great the needs of the community, it is hardly likely that the Institute for Veterinary Research at Onderstepoort would have been expanded to such a scale had it not been for the fortunate coincidence of the man capable of developing it and the Government capable of appreciating the man. Paul Kruger recognised the genius of Arnold Theiler and gave it full play; later, Milner, Botha, Smuts, and Herzog pursued the self-same policy. The result is an institute of comparative pathology where is being carried out research of importance not only to veterinary but also to every other branch of scientific medicine.

"The extraordinary value that work under these conditions may have is easy to perceive. The student of human diseases sooner or later turns to the experimental method. It is inevitable that this should be so. The time must come when the question arises, What would happen if such a reaction were modified in such a way? and the experimenter seeks to produce infection of a laboratory animal. But he is then met with the very reasonable criticism that he is no longer dealing with disease as it naturally occurs. The infections produced in his laboratory animals differ fundamentally from their very inception from those occurring in human beings; the whole course of the disease is different, and the fallacies inherent in this method of investigation may be so great as to render it worthless. It is for this reason that the necessity for the closer study of diseases occurring naturally in animals is so urgent. The elucidation and cure of such diseases as horse-sickness, lamziekte, quarter evil, and the like is of immediate practical importance, but it is still more important for the veterinary scientist to study by the experimental method disease as it occurs naturally. If he wishes to produce active immunity he can work with attenuated living viruses. If he wishes to investigate that enormously important subject the infections of mucous membranes, he has unimpeachable material at hand; he is not reduced to swabbing a rabbit's throat with pure cultures of streptococci, or feeding the creature with bile and typhoid bacilli.

"It is thus from a broader point of view than the merely utilitarian that the development of a living science of comparative pathology is so desirable, and it is Sir Arnold Theiler's peculiar merit that he has had the vision to appreciate this. Onderstepoort was founded to meet the needs of the farmers, and nothing is allowed to interfere with the routine duties of the institute. But always the ideal of research has been upheld by the director. To him no routine investigation is so dull and hackneyed that it ceases to ask a question; no problem is either too difficult or too elementary to merit consideration. The whole institute is permeated with his controlled enthusiasm, and it is a research centre of which any country would be proud."—*The Lancet.*

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The Veterinary Record.
16th January, 192

FERTILITY AND STERILITY IN DOMESTIC ANIMALS.

There can be no doubt that the paper by Mr. Hammond, which we print on another page, represents a great advance in practical co-operation between the scientist and the farmer. Mr. Hammond is deservedly well-known for his researches into the function of the corpus luteum, the causes of intra-uterine death, etc., but it is not as widely appreciated as it might be that these researches have very important practical bearings. We occasionally meet with farmers who affirm that they are well able to manage their affairs without the help of those who are somewhat summarily dismissed as "not practical." But even these cannot fail to be interested in the possible causes of their success. The farmer whose method of feeding happens to favour fertility may be surprised to learn that his good results should be traced to that factor and not to the virtues of the particular breed to which he pins his faith, and there may perhaps be one or two not a hundred miles from Romney Marsh who will find Mr. Hammond's remarks on breeding from twins of very practical importance.

It was not to be expected that there should be no room for differences of opinion on such a subject as sterility. Mr. Hammond's "few remarks of a general nature" on the breeding disabilities of females might be much expanded and we hope they may serve as texts for further addresses. We are a little concerned at the conception of ovaries cumbered with a number of yellow bodies—especially as Mr. Hammond has seemed to imply that one yellow body prevents œstrum and this the formation of others. We should like some information as to the importance of very early and usually unnoticed abortions, particularly in cattle. Some writers attach considerable importance to these and we are aware that Mr. Hammond knows much more about it than he could well condense into a short paper. Then, again, we have some hesitation in printing a reference to "that most dreaded disease, contagious abortion." We believe in Bang's bacillus because we must, but certain eminent contributors to our own and transatlantic journals become almost heated if we fail to recognise for one moment that many other bacilli produce like results and that contagious abortion is no longer to be spoken of as if it were a specific disease.

All of this tends to prove that the condensation which editors are obliged to demand may sometimes do less than justice to the author, however it may whet the appetite of the reader. But the way of the reader is clear. There are many paths in which more information can be found and these it is his duty to tread. In the matter of sterility, veterinarians can claim to be in advance of their medical confrères, but there is still much to learn, both in the laboratory and on the farm. Mr. Hammond has given a most interesting and valuable sketch of the sort of knowledge which can help us most. In so doing, he has indicated the assistance which the farmer can give, by means of individual records, more detailed herd books, etc. In this, as in so many things, it is co-operation which counts and we commend his paper for reading and re-reading to all those interested (and what farmer is not ?) in the breeding of domesticated animals.

CLINICAL REPORTS.

Leg Constriction Lesions.

By J. R. A. Jones, M.R.C.V.S., Gloucester.

I was very interested to read of Mr. Parkin's specimen shown at the Central V.M.A. meeting, as I had a very similar case recently.

Early in May last an aged Spaniel was brought to me with a swollen foot and having a circular wound just above the foot, the history being that the dog had been lame "about a week or two." The wound was washed, but I could find nothing in it (no foreign body, etc.) and I presumed the injury had been caused by the foot having been caught in a noose of wire, etc.

I did not see the patient again until a month ago. The owner stated that the dog had been lame, more or less, since I saw it before. The original wound was now completely healed, but the knee was swollen and painful to the touch, and had three or four very small discharging wounds. I noticed something projecting from one of the wounds and with a forceps I drew forth a *thin rubber band* (*broken*).

Was this the cause of the original injury ? At any rate, the patient is now quite fit and sound again.

Nitroglycerine Poisoning of Cattle.*

By W. C. Nye, D.V.M., Idaho.

On July 23rd, 1924, I was directed by Dr. W. R. Smith, State Veterinarian of Idaho, to make an investigation of losses among the range cattle of Owyhee County, Idaho. This investigation was made in co-operation with Dr. J. S. Allen, of Nampa, Idaho.

From the little town of Murphy, the last railroad point, we proceeded by "flivver" into the range district about fifty miles and uphill all the way.

The cattle were Herefords and Shorthorns running loose on leased and public range.

* Reprinted from *Veterinary Medicine*, Chicago, November, 1924.

We stopped in the immediate vicinity of quite a large mining property located in a narrow canyon, and only a few rods from a small creek used as a watering place by the range stock. All the losses had occurred within half a mile of this mine. Twelve or fifteen head of steers and fat cows were already dead when we arrived and about ten head were affected. The history showed the animals would live four or five days if not disturbed, but if driven rapidly uphill they would drop dead.

After four days the animals would be unable to rise, or if they did manage to stand, by widely spreading the legs, they would fall prone upon being moved.

All muscular co-ordination seemed lost, the legs buckling over at the pasterns, knees and hocks. This muscular weakness and partial paralysis seemed evenly distributed throughout the locomotory structures. A cerebral disturbance seemed apparent by the wild staring and protruding eyes, and shaking of the head from side to side. One animal, a long, yearling steer that was prone, was first given a careful clinical examination. The muzzle was partly covered with a thick, ropy mucous that was whipped to a froth around the nostrils by the rapid breathing. A brownish, crusty discharge was found at the inner canthus of each eye, being due, we think, largely to the excessive lachyrmal secretions, as no conjunctivitis was observed.

The most outstanding symptom was the heart action, the force of the pulsation giving the left ribs a heaving motion. The rate of pulsation was about 150 per minute, but very uneven. Careful palpation of the lungs failed to reveal any congested or hyperæmic areas.

There was no indication of flatulence but the abdomen on the right side was slightly sensitive to pressure. A diarrhœa was noticeable that contained a small percentage of bloody mucous; temperature 102.5

Next we examined a four-year-old Shorthorn cow. She was able to gain her feet but locomotion was somewhat staggering. We were able to get within thirty feet of her, and the terrific heart beat was easily discernible at this distance.

We next made a careful survey of the immediate neighbourhood for poisonous plants. We found none in any appreciable quantities, finding only an occasional lupine, larkspur or aconite plant.

We were firmly convinced that the question of poisoning by plant alkaloids deserved no further consideration, so we proceeded to autopsy the steer we had previously given the clinical examination.

The first thing noticed was the congestion and dilatation of peripheral blood vessels. The rapid heart action could now be partly accounted for, because of the direct influence the vascular tension bears to the force and frequency of the cardiac pulsations. All lymph glands were normal; pericardial fluid was normal in quantity, and there was no hypertrophy of the heart muscle. Lungs were normal except for a small quantity of frothy material in the bronchioles.

The rumen contained about half the normal amount of ingesta, which was quite moist. Reticulum and omasum were apparently normal. The abomasum showed considerable inflammatory areas with occasional necrotic ulcers covered with a pseudo-diphtheritic membrane. The great colon and cæcum contained small hæmorrhagic areas. The bladder was slightly distended with urine, and the inner surface was evenly covered with petechial hæmorrhages.

After completing the autopsy we carefully covered the ground adjacent to the mine in search of some foreign substance these animals could have eaten. At the base of a large ore dump we found about half a case of discarded 40 per cent. dynamite. It was apparent the animals had eaten of this because the waxed containers plainly showed teeth marks and the ground showed where the animals had licked up that portion which had spilled out of the box.

Upon questioning one of the riders we learned that he had actually seen the cattle milling around this particular spot, and had experienced considerable difficulty in driving them away. Some of the cattlemen wondered if it could be possible for the animals to have eaten poison baits placed by trappers to exterminate predatory animals. These baits usually contain strychnine and occasionally potassium cyanide.

We were almost certain that the dynamite was the cause of the trouble and directed that the grounds be carefully cleaned up and the cattle fenced off from this particular locality.

In order to either verify or refute our contention we submitted a sample of the ingesta of the abomasum to the state chemist for analysis. He conclusively proved the presence of nitroglycerine in lethal quantities. No traces of strychnine were found.

Nitroglycerine or glyceryl trinitrate has much the same action upon the heart as ethyl or amyl nitrate, this group being considered the most violent heart stimulants known to medical science. These agents are described as dilating blood vessels, directly stimulating unstriated heart muscle and in toxic doses producing headache, nausea, vomiting, muscular weakness and collapse with cyanosis.

Winslow in his discussion of the action of nitrous ether, amyl nitrate and nitroglycerine, says: "Their important action is upon the heart and blood vessels, the blood vessels becoming relaxed and blood tension lowered." He further states as follows: "This action is no doubt peripheral and is due to direct depression of the unstriated muscle of the heart walls. The heart beats more rapidly in consequence of lessened vascular resistance and direct depression of the inhibitory centre and because a diminished blood pressure indirectly depresses the vagus centre and often stimulates the accelerator."

As a possible efficacious treatment we recommended purgatives of magnesium sulphate and twenty minim doses of tincture of aconite or two ounce doses of chloral hydrate. I do not believe the owners carried out this treatment because of the difficulty in handling these wild range cattle.

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ABTRACTS.

Vaccination du cheval par l'anatoxine tetanique. By P. DESCOMBEY. (The Vaccination of Horses by Tetanus Anatoxin.)—*Ann. Inst. Pasteur.* 1925. June. Vol. 39. No. 6. pp. 485-504. *Ex. Trop. Vet. Bull.*, Nov., 1925.)

Tetanus toxin may be rendered non-toxic by the addition of formalin in the proportion of two per 1,000, the mixture being incubated at body temperature. The toxic power is gradually lost until after about twenty days. Doses of 10 c.c. may be injected into guineapigs without producing any immediate or delayed reaction. A decrease in the amount of formalin added leads to a slower destruction of toxic power and *vice versa*, but too great quantities of formalin are to be avoided because of their reducing the antigenic power of the anatoxin.

The anatoxin produced by formalization of the toxin has considerable immunising powers. A dose of 0·1 c.c. of anatoxin is sufficient to protect a guineapig against ten lethal doses of toxin after an interval of sixteen days. Twenty lethal doses will cause local tetanus, but no fatal result. Anatoxin is capable of producing flocculation with anti-tetanic serum, and it appears to be established that anatoxins which give flocculation with anti-tetanic sera in short periods are more actively antigenic than those which require a longer time for flocculation. Flocculation is therefore an index of antigenic power. Anatoxin can be preserved at room temperature, or in an ice chest for months without deterioration.

Experiments have been carried out with anatoxin on horses as follows:—

Two horses were given 20, 20, and 30 c.c. of anatoxin at intervals of a week, and after a further interval of the same duration they received 2 c.c. of tetanus toxin. This toxin was that in general use for immunisation purposes at the Pasteur Institute and the dose given represented several dozen fatal doses for an unprotected horse.

Five horses received two doses of 20 c.c. of anatoxin at a week's interval, followed by a dose of 1 c.c. of toxin. In one case the interval was a week and, in the other four a fortnight after the second dose.

Three horses were given 15 and 20 c.c. at a week's interval followed by a dose of 1 c.c. a week later. None showed any symptoms whatsoever and they were subsequently given progressively increasing doses of toxin for hyperimmunisation.

With a view to testing the immunity conferred by anatoxin in a manner resembling natural infection, splinters of wood were soaked in sporulating cultures, then heated in a water bath to 80° C. for half an hour, and then immersed in a mixture of cultures of staphylococci, *bacillus pyocyaneus*, and Friedlander's bacillus. Such splinters always set up fatal infections in guineapigs. In the experiments with horses these splinters were planted deeply in the muscles of the neck by passing them through a bleeding cannula and thrusting them deep into the muscles. Two horses were treated in this way, and in the case of four others the splinters were saturated with a solution of a salt of quinine.

Horse 1 was given two doses of 20 c.c. of anatoxin at a fortnight's interval, and No. 2 was given two doses of 10 c.c. at the same interval. Ten days later the infected splinters were inserted into the muscles. A control horse, uninjected with anatoxin, had a splinter inserted at the same time. The control developed tetanus a fortnight later and died. The protected animals showed no symptoms.

Horse No. 3 received doses of anatoxin as No. 2. Nos. 4 and 5 received a single dose of 10 c.c. and No. 6 a single dose of 20 c.c. From 4 to 4½ months later the infected splinters saturated with quinine were inserted. A control was used. The control died of tetanus on the fifteenth day after two days' illness. Horse No. 5 died on the seventeenth day after three days' illness. No. 6 developed symptoms on the fourteenth day and died fifteen days later. Nos. 3 and 4 developed no symptoms.

The methods employed in the foregoing experiments excluded the possibility of ascertaining certain important points regarding the immunity conferred by anatoxin since animals which died under test inoculation were lost, and in those which survived the immunity was reinforced by the test inoculation.

Steps were therefore taken to ascertain whether the injection of anatoxin caused the production of antibodies in the serum. Experiments with guineapigs showed that animals immunised with 0·1 c.c. of anatoxin furnished a serum two months later, 0·5 c.c. of which completely neutralised *in vitro* two lethal doses of toxin. In experiments with horses serum was obtained from Nos. 3, 4, 5 and 6 mentioned above, prior to the insertion of the infected splinters. These sera were titrated against toxin by means of guineapig inoculation with mixtures of serum and toxin, and the existence of antitoxin in the sera of the horses was established. The results were parallel with the infected splinter tests. They showed that double inoculation with anatoxin was more effective than single inoculation. The experiments also showed that this method of testing immunity was superior to others.

With a view to the determination of the amount of anatoxin necessary for the production of antitoxin, a number of horses were injected with doses ranging from 15 to 5 c.c. Six horses received one injection only, but three were given two doses of 5 c.c. at three weeks' interval.

When the sera of these animals were tested, those which had received two doses of 5 c.c. were found to contain larger amounts of antitoxin than the sera of any of the animals which had one dose only. These results, of course, only apply to the particular anatoxin used, and it is reasonable to suppose that had the anatoxin been prepared from a more toxic sample of toxin smaller doses might prove protective.

The author has not been able to reduce the period required for the production of antitoxin in the serum to less than fifteen days, although large doses (up to

300 c.c.) of anatoxin have been injected. The antitoxin is produced slowly and it increases in amount for some weeks after its appearance in the serum can be detected.

Sufficient time has not yet elapsed to allow any opinion being formed regarding the duration of immunity produced by anatoxin, but the facts so far ascertained indicate that it persists for several months.

Zur Frage der histologischen Diagnose der ansteckenden Blutarmut der Pferde. By W. NÖLLER AND J. DOBBERSTEIN. (The Histological Diagnosis of Infectious Anæmia of Equines.)—*Berlin. Tierärzt. Woch.*, 1925. July 24th. Vol. 41. No. 30. pp. 465-472. *Ex. Trop. Vet. Bull.* Nov., 1925.

The authors classify their findings into six groups which are characterised as follows:—

Group 1.—The endothelial cells of the reticulum in the liver are neither swollen nor increased in number. They contain little or no hæmosiderin.

Group 2.—The endothelial cells of the reticulum of the liver are enlarged and often slightly increased in numbers. They contain a variable amount of hæmosiderin. Lymphoid cells as well as endothelial cells may be found in the capillaries. Glisson's tissue often shows an increase in the lymphocyte-like cells. The spleen as a rule contains a normal amount of blood and hæmosiderin, but cases occur in which there may be an abnormally small or an abnormally large amount of hæmosiderin in the spleen. Very frequently large numbers of eosinophile cells were found round the periphery of the follicles.

Group 3.—The endothelial cells are obviously enlarged and are present in increased numbers. They almost invariably contain large amounts of hæmosiderin. The affected capillaries appear as solid strings of cells. The spleen frequently contains an excess of hæmosiderin.

Group 4.—The endothelial cells show a tendency to collect into masses. These masses sometimes contain an admixture of lymphocytes. There is a marked excess of hæmosiderin. The spleen shows a marked reduction in its blood-and-hæmosiderin-content. The aggregation of eosinophiles round the follicles is very inconspicuous. There is a marked multiplication of the lymphocyte elements in the spleen.

Group 5.—The capillaries become distended with endothelial cells and the masses produced present the appearance of small tumours. In the spleen the follicles are not distinct as a result of the multiplication of the lymphoid cells. Eosinophile cells are practically absent.

Group 6.—Is characterised by the more or less complete destruction of the centres of the liver lobules, the place of the liver cells being taken by endothelial cells containing large amounts of hæmosiderin. In the spleen only traces of hæmosiderin are found, and there is increased multiplication of lymphocytes.

The lesions found in Groups 1 and 2 do not definitely indicate the existence of infectious anæmia. The lesions of Group 3 indicate its probable existence, while in Groups 4, 5 and 6 are included cases in which the diagnosis is practically certain.

As the result of their examination of 700 cases in which the existence of the disease was suspected, the following conclusions have been arrived at:—

In 37 per cent. of cases the histological examination indicated that the disease was "probably" or "very probably" present.

The histological changes are the more pronounced according as the animal has had febrile attacks during the weeks preceding death or slaughter. Where fever has not occurred, changes are inconspicuous.

The lesions observed are not absolutely specific, as they occur in such diseases as piroplasmosis and dourine, and are probably to be found in all diseases in which phagocytosis of red corpuscles occurs.

The histological examination is in fact only one part of the general examination, including the history of the case and the *post-mortem* findings, upon which it is at the moment possible to base a diagnosis of infectious anæmia.

At Tonbridge, an interesting case under the Tuberculosis Order, 1925, was heard recently, when Harry C. Skinner, Wickens Farm, Mark Beech, Edenbridge, was summoned for failing to keep a cow which appeared to be suffering from tuberculous emaciation isolated, from October 12th to December 12th, as required.—Mr. F. B. Jevons, defending, pleaded not guilty.

The evidence showed that Supt. Bennett, having been informed of a suspected case of tuberculosis on defendant's farm on October 10th, notified Captain F. F. Horton, M.R.C.V.S., County Council Inspector under the Diseases of Animals Act for the Tonbridge Division of Kent, who examined the herd on October 12th and gave instructions for three animals, which he suspected of tuberculous emaciation, to be isolated. He visited the farm on October 15th and served the necessary notices, and on October 28th tested the animals, and a blue roan heifer reacted to the test, which showed it to be infected. He reported the result to the County Council and the other two animals were freed from the Order, and a slaughter notice given respecting the other, defendant agreeing to this course. Defendant later had the animal examined by his own veterinary surgeon, Mr. A. Spicer of Oxted, who said he found no trace of disease, and defendant wrote to the Ministry respecting the matter and lodging an objection to the slaughter, which was cancelled. In view of the conflict of opinion, Mr. Ernest Peacey, F.R.C.V.S., an Inspector of the Ministry of Agriculture, examined the animal on December 5th. He found it at pasture running with nine others, and its condition could not be differentiated from the others. It was bright and lively, and fed well, and he reported this to the Ministry, who wrote to the County Council that the heifer did not come within the scope of the Order. The isolation notice was withdrawn on December 12th.

Cross-examined, Mr. Peacey said that although it was free from visible signs of disease the heifer should have been isolated on separate premises until the notice was withdrawn.

Mr. Jevons withdrew his plea, and said defendant would plead guilty to a technical breach of the Order. He complied with the Order until November 27th, but he did not know that the Ministry would take so long before making their examination.

The Bench found there was a technical infringement of the Order, and imposed a fine of £1 1s. and £1 1s. costs. —*Kentish Express.*

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DIVISIONAL REPORT.

Southern Counties Division.*

MEETING AT PORTSMOUTH.

Some extremely interesting clinical notes by Major R. Porteous were a notable feature of the winter meeting of this Society, which was held on Thursday, the 10th of December, at Totterdell's Hotel, Portsmouth. The President (Major E. S. Martin, of Christchurch) was in the chair, and the others who signed the attendance book were Captain J. Fox and Messrs. R. E. C. Bullen, Gerald W. Bloxsome, A. Fowler, M. Bridgeman, G. N. Gould, A. J. Moffatt, C. Pack, W. E. Petty and J. B. Tutt, together with the Hon. Secretary (Mr. John Facer).

The minutes of the previous meeting, as published in the *Veterinary Record*, were taken as read and confirmed.

The Hon. Secretary reported the receipt of letters expressing regret at inability to be present from Major F. T. G. Hobday, Major P. J. Simpson, Miss Cust, and Messrs. E. Whitley Baker, W. Caudwell, H. Edie, W. F. Maynard, G. P. Male, J. W. McIntosh, G. Parr, and L. Sheather.

The Hon. Secretary read a letter from the Secretary of the Victoria Benevolent Fund asking for a renewal of the Society's subscription. The letter stated that the fund was at present assisting over forty persons, of whom twenty-nine were widows of veterinary surgeons, some with young families, five orphans left unprovided for, and four members unable to maintain themselves. The cost to the fund of the grants to these recipients was over £1,000, and the subscriptions received last year did not amount to more than £430. Mr. Facer added that he had also received letters asking for subscriptions to the provision of a chain of office for the President of the "National," and to the Garnett Memorial Fund.

The PRESIDENT remarked that they were in rather a difficulty since, in the absence of their Hon. Treasurer, they hardly knew whether their finances would justify them in responding to these appeals.

The HON. SECRETARY said he gathered from the minutes of previous meetings that the Society had been in the habit of voting two guineas each year from its funds to the Benevolent Fund, but the other two appeals were more or less of a special nature.

Major PORTEOUS proposed that they vote two guineas to the Victoria Benevolent Fund, and this was seconded by Mr. BLOXSOME and carried.

The PRESIDENT next asked what they proposed to do with regard to the second letter. He understood the idea was that each Society or Division should provide one link, and it was only right that they should fall into line with the others if their funds permitted.

The HON. SECRETARY: The idea is that the name of the Division shall be inscribed on their link.

Major PORTEOUS proposed that, providing the funds permitted, they subscribe the cost of one link, which he understood was £2, and this was seconded by Mr. PACK, and also unanimously agreed to.

With reference to the other application, for a subscription to the Garnett Memorial Fund, Mr. PETTY suggested that they might ask to know what form the Memorial was going to take before they took any action in the matter. It seemed to him they were being asked to contribute to a Memorial about which they knew nothing.

The HON. SECRETARY: Apparently they want to know how much money they are likely to receive before they can decide on the actual form of the Memorial.

Mr. PETTY: Then I suggest we wait until they have decided. We know the cause, but we do not know what the object will be.

The PRESIDENT said the object was to provide a Memorial to a former President of the Royal College of Veterinary Surgeons.

Mr. PETTY: So I understand. I am not saying that I am opposed to our making a subscription, but I do not like subscribing to anything of which I do not know the nature.

Major PORTEOUS suggested that they should ascertain from the Treasurer how their finances stood.

Mr. PETTY remarked that, although he disagreed with the idea of being asked to subscribe to something the nature of which had not been decided upon, he quite saw that as an old Society they had got to fall into line. Not having a balance sheet before them they did not know what funds they had to draw upon, but there was no reason why they should not make themselves personally responsible say for 5s., which would make up £3 3s.

The PRESIDENT said he hardly thought it was fair to call on those who were present that afternoon to subscribe. Whatever was done should apply to all the members.

Major PORTEOUS agreed, and the HON. SECRETARY suggested that, if the meeting approved, he would write round to all the members and ask them whether they would subscribe and, if so, how much.

Mr. TUTT pointed out that they might put it on the agenda for the annual meeting, which would be held before the end of March, and it was eventually decided that this should be done and that the Hon. Secretary should, in the meantime, try and ascertain from the members what they were proposing to do in their private capacity.

The PRESIDENT reminded the meeting that, when the Society met at Salisbury last December, a letter was received from a gentleman resigning his membership on account of ill-health. That gentleman, Mr. Samson, had been a subscribing member of the Society almost from its inception, and they decided to ask him if he would consent to continue with them as a honorary member. He regretted to inform them that Mr. Samson had since passed away, and he was sure they would all wish to pay the usual tribute to his memory.

* Received on January 4th.

This suggestion was at once acted upon, the members signifying their assent by silently rising from their seats.

New Members. Captain Fox and Messrs. Bullen and Fowler, who had been proposed for membership at the previous meeting, were formally elected and were personally welcomed by the President.

Mr. PETTY asked who was supposed to receive and get in subscriptions, as he had been a member of the Society for some years and, so far as he was aware, he had never been asked for one.

Mr. BLOXSOME said he believed most of the members paid from time to time when they attended meetings, and happened to meet the Honorary Treasurer.

Mc. PACK said he had always had a reminder, but he agreed with Mr. Bloxsome that they generally paid up when they were able to get to a meeting and met Mr. Whitley Baker personally. He could not understand how Mr. Petty had come to be overlooked, but he believed that, although Mr. Baker was their treasurer, he had been in the habit of getting a brother-in-law or some other relative to do the actual book-keeping.

The PRESIDENT suggested that the matter was one they could very well leave to the Hon. Secretary to mention to Mr. Baker when he was next writing to him, and Mr. Petty further suggested that Mr. Facer should, at the same time, arrange with the Hon. Treasurer to have a balance sheet ready at their next meeting in March.

CASES OF INTEREST.

The PRESIDENT next invited the attention of members to some cases of interest which Major Porteous had been kind enough to bring to their notice.

Major PORTEOUS first handed round a number of X-ray photographs, at the same time explaining the circumstances under which the subjects had come under his notice. The first of these skiagraphs was one of a wire-haired terrier puppy, and Major Porteous drew particular attention to the contour of the bowel which, he pointed out, was full of gas. They could also see a tiny speck, which subsequently proved to be a little piece of the outside casing of a bullet. The dog belonged to a range officer, and it came to him suffering from some form of gastro-enteritis. He took a tremendous number of these little pieces away, but he was not altogether satisfied with the case and had the animal X-rayed, with the result they saw before them. It was, he thought, a really wonderful photograph. He managed to get the little bit of metal away and the dog was quite all right again now. The animal, which was allowed to run all over the place, had evidently picked them up when on the range. The next photo to be handed round was one showing a dislocation of the femur in a black spaniel. This animal, Major Porteous said, was a good shooting dog, and as a result of the X-ray disclosure he was able successfully to reduce the dislocation, and the dog was now working as well as ever. The third photo was one of a Sealyham terrier with a stone in the stomach. In this case the animal died two hours after the X-ray, which was taken too late for an operation to be performed. Another photo was of a cocker spaniel suffering from a dislocation of the femur, which was successfully reduced as a result of the knowledge obtained by the X-ray, while yet another photo was one of a cat. Several cats had been found dead and shooting was suspected. The picture they had before them ended the shooting and the deaths, Major Porteous added, for they could see the shots everywhere. The sixth photo was of a pregnant Yorkshire terrier bitch. He was very doubtful as to what was going to happen, and, as they would see from the picture, there were four distinct puppies. By having the photograph taken he was able to bring away all four puppies all right, and very much more easily than he should have done otherwise.

Major Porteous also handed round yet another X-ray skiagraph in which he himself was involved. He had the misfortune to be thrown down out of a trap and, as they would see, there was a slight dislocation of the wrist. Proceeding, Major Porteous related an experience which he had while in France, and which had given him a hint that had been very useful to him ever since in the way of surgery. "I had to run round" he said, "in a little old motor ambulance, and on one of my journeys I came across a horse that had been badly wounded. There was nothing in the way of water anywhere near, but on looking in the car I found I had a spare tin of petrol, and I used this to wash the wound and made arrangements for the horse to be taken into hospital. The wound did exceedingly well. It was a ghastly wound, but I sponged it with petrol for about fifteen days, and it healed up beautifully. Ever since then I have used petrol in the dressing of any number of wounds, and I have been extremely satisfied with the results. Provided nobody has interfered with the wound or touched it with water, you will find, if you sponge it with petrol and thoroughly clean the wound, that your wound will heal up in a way that will astonish you. I was called out in the middle of the night nearly two years ago to an accident in which a horse attached to a market gardener's van had been run into by a motor. There was a wound just behind the point of the shoulder of the animal, $4\frac{1}{4}$ inches long, and very nearly $1\frac{3}{4}$ inches wide. I got to the spot about five o'clock in the morning, and thinking the wound would be a suitable one for suturing, I sutured it and said I would be back again in two hours' time. When I went back, I found that the owner had attempted to put the horse into a float with a view to taking it back home, and in doing so the horse had torn itself to pieces, removing every suture I had put in. I used petrol on this wound, and got the horse into a stable close by, and in just over three weeks you could not see anything more than a mere scar. I may say that the petrol I use is Aviation Spirit, the best petrol. While on the subject of operations, I may mention that I was at Southampton one day at a meeting of this Society at which my friend Hobday was operating on a rig. I think some of you will remember the occasion. The operation was done as only Hobday can do it, and I believe he said he washed the place with petrol,

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and then just touched it over with iodine. After he had finished someone asked 'what about the next morning or the day after?' and Hobday said there would not be any pus, and I think he was right."

Mr. FACER: There was some pus and also some blistering of the skin. I wrote and told Major Hobday about it at the time.

Major PORTEOUS: At any rate, in the great majority of cases if you use petrol to wash a wound before you begin, you will find you will have a very much smaller amount of pus, if any, in the wound afterwards than if you use a watery solution of anything. Petrol, I know, smarts very badly. I know that from personal experience, for not so very long ago I was pitched out of a trap and got a nasty cut over the eye. A nurse came along and asked if she could be of any help. I told her I should be glad if she would help me, and I dressed the wound with what I had in my bag—petrol. That wound was a cut a little over half an inch long, and it healed in five days. I had another cut on my knee which I did not notice till after I had got home. That was not dressed with petrol but was shown to a doctor, and it lasted for a fortnight. I do not want you to take everything I say for Gospel, but I do say that if anyone wants to treat a wound he might well consider the use of petrol in doing it. Petrol will dissolve iodine if you want to do so. But there is just one thing I would like to say and that is, if you are going to use petrol, do not attempt to use it after water has been put on. Let the part be absolutely and thoroughly dry and free from any contamination by water, because, after all, water is usually one of the dirtiest things you can possibly use. One more experience before I sit down, if I am not wearying you. One Sunday night two young fellows who had come down from London brought me in a dog with a broken leg, which had been bandaged up in plaster bandages and, if you will believe me, it was absolutely solid plaster of Paris. They would not tell me who did it, but I discovered afterwards that it was not a veterinary surgeon. It took me a good hour and a quarter to chip the thing off, and when I got it off the dog ran round about on the floor, the leg not having been broken at all. Possibly all of you know this, but quite a good way of bandaging a leg is to make a splint of either cardboard or wood, pad the leg carefully, with cotton wool, put the splint on, then bandage it round as tightly as you possibly can with an ordinary linen bandage and on the top of that, instead of putting plaster of Paris or anything of that sort, finish up with an ordinary Mead's plaster. The great advantage of Mead's plaster is that practically no dog will ever get it off. Then, when you have had the dog in this plaster for three or four weeks, or as long as you think you require it for the healing up of the particular fracture that you have bandaged, you just take a good sharp knife, cut it right down, and the whole thing comes off in about a second and a quarter.

The PRESIDENT said he was sure they were all of them very grateful to Major Porteous for bringing those very interesting items of clinical work to their notice. He did not propose to open the discussion himself, but he hoped someone else would.

Mr. FACER said he should like, if he might, to recall the case of the pony on which Major Hobday operated at Southampton. The pony did not do at all badly, but it did not do quite as well as he had expected. There was a good deal of swelling and also some discharge. There was a little suppuration as well and, as he had told them, the skin was badly blistered. The pony stayed at his place for a fortnight, and it was really well when he sent it home. He had, as they knew, kept it for a considerable time, and he sent in an account for its keep which the owner refused to pay, and he said the pony had never been right since. He said there was a "chink in the back"! He (Mr. Facer) would like to know what that expression meant. With regard to the setting of a dog's leg, he had no fault to find with a plain plaster of Paris bandage, which he made himself by unrolling an ordinary surgical bandage, and then applying the plaster of Paris. But he suggested the use of plain rubber gloves.

Major PORTEOUS said the dog to which he was referring was bound up in a plaster cast; it was not merely a plaster bandage. But, at the same time, if he might disagree with Mr. Facer, he would probably find that for a broken leg Mead's plaster would be just as suitable as the other, and it certainly was very much cleaner. He preferred his own way, because he had had a great deal of success with it, and it was certainly worth trying.

The PRESIDENT remarked that he had been greatly interested in the skiagraphs Major Porteous had shown them. Work of that sort was very valuable as an aid to diagnosis, but the great bar was the expense. In his district it was generally done by a doctor, and he did not think it was possible to get one done much under three guineas. They also always insisted on the patient being chloroformed. He did not know whether that was Major Porteous' experience.

Major PORTEOUS said the first photo he showed them, which he thought was really one of the best, was taken with an exposure of less than three seconds.

The PRESIDENT said he might mention that at the present time he had a case under his care of a small terrier which had been bitten by an Alsatian right through the leg, producing a compound comminuted fracture of the tibia, with numerous septic punctures. He was asked to keep the dog alive, and he was greatly puzzled how to treat it. As a fact, he had done practically nothing, and the wounds had now healed up, and he was going to put a Mead's plaster bandage on to set the limb.

Other interesting experiences were related by Mr. GOULD, and Mr. PACK, and before the meeting broke up, cordial acknowledgment was made by the President of the kindness of Major Porteous and Mr. Petty in acting as hosts for the day.

The next meeting of the Society will be the annual one, and this will be held in London at the end of March.

J. FACER,
Hon. Secretary.

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NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

January 21st—R.C.V.S. Special Meeting of Council.
March 31st—Garnett Memorial Fund—Closing Days.
April 1st—R.C.V.S. Annual Fee of £1 1s. 0d. due.
„ 8th—R.C.V.S. Committee Meeting.
„ 9th—R.C.V.S. Committee Meeting; Council Meeting 2 p.m.; Garnett Memorial Fund Committee Meeting.
June 30th—R.C.V.S. Annual Dinner, Hotel Victoria, London.

Royal College of Veterinary Surgeons.

COUNCIL ELECTION, 1926.

The following gentlemen have been nominated for election to Council R.C.V.S.:

Name and Address.	*Proposers.*
ABSON, JOSEPH, Norfolk Street, Sheffield.	J. M'Fadyean. O. Charnock Bradley. J. W. Brittlebank.
BRITTLEBANK, JOSEPH WILLIAM Yew Tree House, Northenden, Cheshire.	G. H. Locke. Trevor F. Spencer.
COLEMAN, JOHN CHAS. Swindon, Wilts.	Sydney H. Slocock. Joseph H. Carter J. W. Brittlebank. Trevor F. Spencer.
HUGHES, RICHARD Rhianva, Oswestry, Salop.	John T. Allen. John Spruell.
MOORE, SIR JOHN 16 Frognal Lane, Hampstead, N.W. 3.	J. M'Fadyean. Stewart Stockman.
SUMNER, H. Chapel Court, 15 Vauxhall Road, Liverpool.	John T. Allen. John Spruell.
WEST, ERNEST ALFRED 81 Gray's Inn Road, London, W.C. 1.	J. Clarkson. A. Gofton.
LIVESEY, GEOFFREY H. 2A Liskeard Gardens, Blackheath.	J. M'Fadyean. John W. McIntosh.

R.C.V.S. OBITUARY.

ROBERTSON, Edward George, 9 Lampton Road, Hounslow. Graduated May 28th, 1894, London. Died 27th October, 1925.

CORRESPONDENCE.

"Our Dumb Friends' League."

TO THE EDITOR OF THE VETERINARY RECORD.

Sir,—With reference to the recent correspondence in your columns, regarding the activities of free hospitals maintained for the treatment of animals of poor persons, but which are not administered by qualified veterinary practitioners, I write to draw attention to the following resolution passed by the Committee of the Animals' Hospital of "Our Dumb Friends' League," 1 Hugh Street, Victoria, on the 18th December.

Read a letter from Lord Lonsdale, the President of the League, in which he states his opinion for the information of the Committee, that no Society such as Our Dumb Friends' League should allow any unqualified man to act as a veterinary surgeon in cases for the League, but he should be there as assistant, to act under a properly qualified veterinary surgeon's instructions. Additional correspondence which was read showed that Lord Lonsdale had been in correspondence with Professor Hobday, who concurred in this view.

It was resolved "that this Committee agrees with the above view, and is of the opinion that there is no alternative open, but the re-organisation of the hospital staff, so that the post of Manager is combined with that of a qualified resident veterinary surgeon."—Yours faithfully, Lieut.-Col. M. W. DOUGLAS, Secretary, Our Dumb Friends' League.
72 Victoria Street,
London, S.W. 1.
January 11th, 1926.

The Editor acknowledges the receipt of the following:—
Communications from Messrs. T. Dalling, C. T. Goodall, C. S. Randle and Major-General Sir F. Smith.
Report of a meeting of the North of Ireland Division, from Messrs. H. G. Lamont and H. L. McConnell, Hon. Secretaries.

National Veterinary Medical Association of Great Britain and Ireland.

EDITORIAL OFFICE: 10 Gray's Inn Square, London W.C.1.

All communications relative to the literary side of the Veterinary Record must be addressed to the Assistant Editor, "Veterinary Record," 10 Gray's Inn Square, W.C.1

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